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SELECTED TRANSLATIONS ON SOVIET SCIENCE

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SELECTED TRANSLATIONS ON SOVIET SCIENCE

[Following are the translations of selected items on various aspects of Soviet science. Complete bibliographic information accompanies each article.]

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M. L. MIL' AND HIS DESIGN BUREAU

-USSR-

[Following is the translation of the article "They Are Furthering the Glory of the Fatherland," by I. Tsyganov in Nedelya (The Week), No 36, Moscow 1960.]

MI-1, MI-4, MI-6

In 1948 the "MI-1" helicopter, which greatly surpassed foreign single-motor helicopters in speed and altitude, appeared in our country. With a full flying weight and complete equipment it developed the unheard of speed of over 200 kilometers per hour and rose into the sky to an altitude of better than five kilometers.

Two years later this remarkable machine was put into operation and a year after that, at the aviation parade in Tushino, thousands of Muscovites watched with admiration the flight of an entire group of metal dragonflies.

This was the first helicopter in our country which could be successfully employed in the national economy. It was created by a collective headed by one of the youngest Soviet aircraft designers, Mikhail Leont'yevich Mil'. He had not yet reached the age of forty when he won his first great victory.

When at the end of 1952 a new helicopter rose into the sky helicopter building abroad was instantly left several years behind. The fuselage of this machine bore the letters "MI-4." Lastly, a veritable aerial giant, the "MI-6" helicopter appeared in our country's sky. No other country has such a machine.

Helicopters created by the collective of designers under the direction of the Doc r of Technical Sciences M. L. Mil' than 30 world records, having thus firmly won for our country the fame of the leading helicopter state.

It would be difficult to enumerate all the countries in whose skies these remarkable machines now fly. Suffice it to say that the "MI-1" and "MI-4" have been purchased from the Soviet Union by seventeen foreign countries.

At the present time the collective of designers headed by M. L. Mil' is working on new, more advanced and speedier helicopters. In the roomy well-lighted workshops of the design bureau, men in white coats sit at the drawing boards. New bold plans are born from the combinations of lines, columns of figures, and calculations. Each one of them exhibits the daring idea of the talented Soviet aircraft designer Mikhail Leont'eyvich Mil'. Last year he became 50 years old. The Soviet government has prized highly the merits of this creator of helicopters and has awarded him the Order of the Red Banner of Labor.

PHOTOGRAPHIC STORY OF A MOSCOW HOSPITAL

[Following is the translation of an article by Yevgeniy Tikhanov in Nedelya (The Week), No. 39, Moscow, 1960, pages 16-17].

On the table lie several thick books and folders with letters and telegrams. These are responses from patients, their thanks and their wishes.

"All my life, millions of times, day and night, asleep and awake, I will thank you."

"From my whole soul I thank you for your treatment, for your tactful, attentive attitude toward your patients."

"None of us strive to be put into a hospital and those who have been in one remember it without much pleasure. However, I found that there are exceptions even to this rule."

To whom are these letters addressed? Who is this physician, the finest, the most tactful, the best beloved by his patients? I asked.

"To Nikolay Matveyev, Nurali Effendiyev, Tamara Stepanova, Igor Rozanov .. simply speaking, to all our surgeons and therapeutists," answered head doctor Nina Petrovna Brusova. "It is really difficult for me to say which of them is the best. In our hospital there is an unwritten law: Until you have not 'led out' the patient, until you are not sure that the illness has begun to recede, do not go home. It is too complicated a subject. This work must be seen during the daylight activity and during the night watches."

So I went on "watch" in Moscow Hospital No 50, in Temiryazevskiy Rayon, to the Second Department of Surgery of the Central Institute for the Advanced Training for Physicians, directed by Professor B. Osipov. Thus, this photographic story was born. [The numbers refer to photo caption numbers in the original].

1. The color of the signal lights at the crossings meant nothing. The automobile with a red cross sped through the city doing 100 kilometers per hour. The automobile hurried to get to him.

However, he did not know it yet. As usual, Katya, the head nurse of the division was telling him the night news as she handed him his white coat. Surgeon Igor Borisovich Rozanov was beginning his work day.

2. When the signal lamps were lit, in the entire world there remained only the patient and he at the operating table. Strength, knowledge, nerves, experience, will, all these are fighting for the human life, but still the blood pressure was falling ... falling ...

On his fingertips he carried her life and did not drop the precious burden.

3. Thus the night dragged on. Doubts alternated with hope, with efforts to foresee everything.

4. And only in the light of the morning did the line between life and death began to disappear.

5. Only later, toward evening when the patient awoke, he sat by her bed in the twilight. The worst was over. The day had passed and maybe he should go home. His wife and daughter are at home. But how could he go, how could he leave this barely twinkling life? Anything can happen ... What if during the night your hands will again be needed to keep her on this side of the line?

6. In the morning the head nurse of the division was helping him into a fresh white coat. She was telling him something funny. When he turned around, several grey hairs flashed in the sunlight but she did not tell him about them. His father, Boris Sergeyevich Rozanov, a professor and a world-renowed surgeon, also said nothing about this. He listened to the story of his son. This was a report of a junior to a senior. "Thirty six hours ... How many such hours I had lived through," thought the father, "and how many more will both he and I have to live through?"

7. The street lights are turned off. A grey winter morning arises over the city. The night, so quiet and peaceful for most people, is over. The night is over and it is time to go to work again. The people are waiting for the bus. At nine o'clock Igor Borisovich Rozanov will also arrive at the Hospital No 50 of Moscow. It is unlikely that anyone of those standing next to him can visualize the recent thirty-six hours of his life. There are quite a few people with hair turning grey .. you too, probably, will not notice him in the usual press of the street.

THE NEW SIBERIA, THE SCIENTIFIC SIBERIA

-USSR-

[Following is the translation of an article by B. Azarov in Nedelya (The Week), No 37, Moscow, 1960, page 10.]

Three years .... This is a short period in the destiny of man; in history it would appear to be even less noticeable. However, these thousand days plus, from the day of the foundation of the Siberian Division of the Academy of Sciences USSR proved to be a gigantic period in scientific life.

Many of the buildings of the institutes of the future scientific settlement are still under construction, but the work of the scientists is already evident and recognized by industry.

We knew Siberia as an enormously rich natural storeroom. We have come to know a Siberia of machinery, electricity, virgin soil. Now the new scientific Siberia is gathering strength, Siberian science begins to take over the lead in the cultural life of the promised land.

Our correspondent tells in this issue of the creative ideas and the search for new ways in some Siberian laboratories.

The Tsar-Cannon

They sat at the same table -- Nikolay Olen'kov, who had recently arrived from a technical school, and Bogdan Voytsekhovskiy, the well-known scientist. They heatedly discussed the new problem facing their laboratory. In this laborabory the "tsar-cannon," the new hydraulic excavator, or hydromonitor, was built. I took their picture at that very moment.

Nowadays no one would be amazed by a hydromonitor. They have been used for a long time in stripping operations and in hydraulic coal mining, in which water breaks off a layer of coal and brings it to the surface.

The trouble is, however, that the jet is not strong enough to break up very hard coals and it is not economically sound to increase the pressure above 40 atmospheres in the existing machines.

The Siberian water jet, or, as it is called here, the "hydro-cannon" is constructed on a new principle. It ejects a pulsating stream. In one second the pressure increases to 1,000 atmospheres. In an instant equal to one-hundredth of a second, a jet

of enormous strength is ejected. Such a jet can not only easily break up any layer of coal but can also be used for digging mine shafts: as a graphic example we can say that with "one shot" the jet can break through a half-meter-thick layer of wood or a 100-millimeter reinforced concrete plate. It is difficult to find a barrier for the sabre-shaped jet shot out of the nozzle of the apparatus with supersonic speed.

Incidentally, during the construction of the new hydromonitor the designers have, almost by accident, made one more discovery. At one time during their work on the jet they needed several centrifugal pumps, but these were not available. They had to wait. Wait, when almost all was completed? Wait, when almost every day the telephone rang with inquiries from the Kuzbass? They built a centrifugal pump themselves. It was not of the usual type. The designers decided to remove the main cause of power losses in the pump, namely, the friction of water against the walls, by making the walls rotate also. Thus, in the laboratory a new, unusual pump came into being. The efficiency of even the hand-made model of the pump increased to 70 percent. This is not the limit. The designers are confident that it can be increased to 90 percent.

This carousel pump can be successfully used in mines for the separation of coal from water, dispensing with the giant settling ponds which are especially inconvenient in winter.

Meanwhile the inventors are thinking ahead. They propose to utilize their pump on ships as a hydraulic transmission. Turbo-electric ships will become turbo-hydraulic ships!

The Fight Against Biting Insects

It is difficult to name an area where chemistry does not extend its helping hand to man! Here is one of the minor but extremely important achievements of Siberian chemists. They found a repellent against gnats, midges, mosquitoes, and horse-flies -- the scourge of many regions of Siberia.

The Institute of Organic Chemistry has, for the first time in the USSR, synthetized a new compound, diethyltoluamide. This summer an expedition of the Biological Institute traveled with this new compound to the most insect-infected place. The compound was tested against mosquitoes, midges, wood-lice, and horse-flies. Even in the presence of a large accumulation of insects when every minute one is attacked by two or three horse-flies, the compound repelled the pests for 8-9 hours with absolute reliability. The compound has a pleasant odor, does not stain, does not rub off .. in short, it has all the positive qualities. However, there is still very little of it. Its production must be organized right away. Then, by next spring, this compound will be available on the market.

Barriers Against Virus

Interesting documents exist in the Presidium of the Siberian Division. Below is a passage from one of them:

"... In all patients who began taking the drug at the very beginning of the illness, fever and catarrhal symptoms ceased on the day following use of the drug. The patients did not develop any symptoms of intoxication, were not hospitalized, and did not miss any work ..." The document is signed by the head physician of the Fourth Hospital for Contageous Diseases of the city of Novosibirsk, K. A. Dement'yev.

In this hospital preliminary tests were performed with a new drug against influenza (grippe), which was prepared in the laboratory of the Institute of Cytology and Genetics.

The Pharmacological Committee of the Ministry of Public Health USSR recommended the drug for extensive testing in the clinics of Moscow, Kiev, and Novosibirsk...

"The grippe, as well as a number of other virus infections," explained R. I. Salganik, head of the laboratory which developed the drug, "is the result of the penetration of the cells of the organism by viruses and their rapid propagation. We have succeeded in isolating an enzyme which arrests the process of propagation of the virus. At the same time it has no effect on healthy cells. The new drug is based on this enzyme. It must be noted that the enzyme destroys various types of viruses; in grippe, viruses begin to multiply in the upper respiratory tracts, therefore, it is easy to ensure contact of the enzyme with the grippe virus."

* * * * * *

Three laboratories ... Three minor pieces of information on discoveries and beyond the horizons of new discoveries. Mathematicians and physicists, geologists and economists, biologists and mining engineers, today all of them can tell of new discoveries made in the new institutes of Siberia, of the achievements which have already passed beyond the laboratory walls into the factory shops and onto the fields of the collective farms.

Photographs by the author, Novosibirsk:

Photograph 1. At the vacuum installation in the Institute of Catalysis. Chemists can be proud of the new works of the Siberians in this sphere of science.

Photograph 2. In the Hydrodynamics Institute new work is being discussed.

ON THE THRESHOLD OF THE SECRET OF REGENERATION.

NOT A FAIRY TALE, BUT A TRUE STORY

-USSR-

[Following is the translation of an Article by T. Trofimova in Nedelya (The Week), No 37, Moscow, 1960, page 6.]

"Unless wonders were fervently desired they could not occur," wrote Herbert Wells in one of his science-fiction stories. Human imagination likes to look into the future. Nevertheless, the wildest dreamers of the past would back up in amazement before the achievements of modern science ...

For many years extremely interesting experiments have been conducted in the Scientific-Research Institute of Animal Morphology of the Academy of Sciences USSR under the direction of Professor A. N. Studitskiy. The researchers are interested in one of the complex biological problems, namely, the problem of regeneration.

Is it possible to regenerate organs of the human body which have been subjected to the destructive activity of an external medium? At this time biology and medicine cannot give a definitive answer to these question. The study of the processes of regeneration are inalienably connected with the knowledge of one of the great "mysteries" of nature, that of the self-restoration of the human organism.

How Many Days Do the Eyelashes Live?

The solution should be sought within the organism itself. Do you know how long the life of your eyelashes is? -- 150-200 days. After this new ones appears. Fifteen-thirty grams of hemoglobin are restored daily in the blood. It has been found that our organism possesses a wonderful power of self-regeneration. This is a perpetual process which is not interrupted for a single instant. Every organ of the body performs some function which destroys it. However, all the organs are regenerated through the division of cells. Therein lies the principal difference between living and dead matter.

The Newts and We

Nature has bestowed a rare property on the wiggly denizen

of ponds and pools, the newt. Cut off his paw, tail or jaw and a month later new ones, which are in no way inferior will appear in their places.

For many years science was dominated by the hypothesis of the extinction of regeneration in the course of the development of the animal world. The lower the organized animal, the "easier" it regenerates itself, it was assumed. The hydra can regenerate the entire body from a small piece, the triton can regenerate a limb, a mammal is capable only of healing wounds.

At the same time, it is well known from surgical practice that after an operation the liver and the pancreas are easily "regenerated" in man. However, the internal organs of lower animals do not regenerate as well.

These facts prompted Professor A. N. Studitskiy to verify the existing hypothesis. Experiments yielded amazing results.

The Organism Itself Is the Surgeon

A man lies on the operating table. He was brought to the hospital suffering from a painful affliction in which the bones are destroyed.

The final preparations are in progress. The surgeon puts on his gloves and begins the operation. Having exposed the diseased bone he performs a longitudinal incision of the periosteum. The difficulty lies in the complete enucleation of the diseased bone. At last it has been removed. A plaster core impregnated with antibiotics is inserted in its place. The assistant sutures the incision. This concludes the work of the physician and begins the regenerative activity of the organism. It is as if the organism itself becomes the surgeon, completing the operation. After a certain period of time a healthy bone grows in place of the one that had been removed ...

This is not a passage from a science-fiction novel. Such operations are already performed, although they are not widely practiced. Quite recently scientists did not know that it is possible to remove the entire bone and not only the damaged portion thereof. The greater the injury, the more intensive is the process of regeneration. By removing a bone we greatly stimulate the periosteum from the cells of which the bone grows anew.

In the laboratory of the Institute a tubular bone was removed in a young rooster up to three times. It reappeared after each removal. Evidently the bones have a perpetual capacity for regeneration. In the newt, however, an entire leg grows again but not a single bone is regenerated. It appears that man and the mammal possess a much greater capacity for self-regeneration than the lower animals. The example of the newt is only a special type of regeneration developed as an adjustment to the destructive conditions of the ambient medium.

Do "Everlasting Tissues" Exist?

Until the most recent times the skeletal-muscular tissues were considered to be "everlasting." "They are almost incapable of regeneration. On the place of the injury scar tissue is formed and not a new muscle," asserted the surgeons.

In the Institute of Animal Morphology it was decided to use birds for the investigations. Up to now frogs, newts, and axolotls were used as the subject of such experiments.

A large portion of one of the brachialis muscles of a pigeon was experimentally excised. Only one month later complete regeneration was observed. Gradually a third of all the brachialis muscles were removed. The result was the saml: Thus the concept of "everlasting" tissues was refuted. They do not exist. Muscular tissues consist of fibers which multiply by nuclear cleavage.

Again, as in the experiment of regeneration of the bones, the intensity of the injury affects the intensity of the formation of the new tissue.

If a portion of the muscle of a young chicken is reduced to the state of a semi-liquid pulp and then spread in a fine layer on the spot from which it has been removed, five or six days later new tissue will appear. This is a way to performing truly miraculous operations of transplantation of tissues.

... A man's face is injured, for example; the muscles of the mouth are missing. Perhaps all that has to be done is to take a less important muscle, say from a leg, and to transplant it in a finely divided state to the location of the missing one. The successes of the experiments with animals permit us to hope for its complete regeneration.

A Model of a New Heart

A countless number of people stricken with cardiac ailments are doomed to excruciating pains and perhaps, death. Medicine is as yet unable to "present" them with a new healthy heart.

In Professor A. N. Studitskiy's laboratory a tiny model of the heart of the chicken embryo, which contracted like a natural one, was obtained. It originated through the transplantation of the finely divided heart of one embryo onto the embryonic membrane of another heart. This is only an experiment. But its success proves that the function of self-regeneration is inherent even in such a complex human organ as the heart. There is no definitive opinion on this subject as yet. However, it is doubtless that this represents another victory that has been won in the fight of science for health and longevity.

Take Good Care of Your Nerves"

Very often such advice was the only help which the doctor could extend to the patient. The organism is unable to regenerate destroyed nerve tissue. Is this true? A series of experiments at home and abroad proved that nerve cells, or neurons, also multiply by fission.

... The day will arrive when the medic will learn to direct the human organism with the same ease as today's flier steers a plane. In the area of physiology not a single dark spot will remain. Man's worst enemies, the diseases, will retire forever. The study of the processes of self-regeneration of our organism is one of the routes to victory over them. The ultimate mastering of the great mystery of nature, constant regeneration, will permit man to perform brilliant surgical operations. Experiments in regeneration performed under the direction of Professor A. N. Studitskiy permit us to look into the wonderful future. However, years of research, discussions, and endless experiments separate the daring assumptions which the scientists are even now able to make from their practical realization.

Photograph by V. Akhlomov:

Professor A. N. Studitskiy and Candidate of Biological Sciences Z. P. Ignat'yeva in the laboratory.

IN THE LATVIAN INSTITUTE OF PHYSICS

-USSR-

[Following is the translation of an article by Yu. Koryakin in the Atomnaya Energiya (Atomic Energy), Moscow, December 1960, pages 512-514].

In Salaspils, 20 km from Riga, construction is being completed of the research nuclear reactor of the Institute of Physics of the Academy of Sciences Latvian SSR (Illus. 1)*. The reactor under construction is of the IRT type (thermal capacity 2000 kw) and is the first of its kind in the Baltic Republics. Similar reactors have been built in various localities of the Soviet Union.

[* Photographs not reproduced here.]

At the present time the finishing and assembly operations are in progress (Illus. 2) in the reactor building. Some of the administration buildings is already completed and in them the work on the direct preparation for research with the reactor has begun. Servicing of the control-measuring devices, systems of control and protection, and the dosimetry laboratory will soon begin to operate. Assembling of the reaction tank is completed and the construction of the solid concrete biological shield is near completion. The reactor and its equipment are being assembled under the direction and with the immediate participation of the personnel of the reactor laboratory of the Institute. Important assistance in this work is rendered by the members of the Order of Lenin Institute of Atomic Energy imeni I. V. Kurchatov and other organizations.

In the construction of the reactor a significant portion of the work is performed and many of the orders are filled by the staff of the Institute of Physics and by enterprises of the Latvian Sovnarkhoz (Council of National Economy). For example, the control board of the reactor will be designed under the direction of members of the Reactor Laboratory of the Institute and built by Latvian enterprises.

In the process of constructing the reactor the builders had to master a number of new techniques. For example, they mastered the method of preparing and pouring heavy concrete. In the zone of the most intensive radiations a heavy concrete of 6.5 g/cm^3 density is used, and in the other shielded areas, a 5.2 g/cm^3 concrete is used.

In accordance with the plan of scientific work outlined for the reactor, the proposed type of the project was modified. Thus, instead of the originally planned single hot cell, two hot cells are being assembled.

The government of the Latvian SSR shows a continuous interest in the progress of the construction of the reactor; this is particularly true of Chairman of the Council of Ministers Ya. V. Peyve, who frequently visits the construction site.

When the reactor is started up it will become possible to effect a vigorous expansion of the work of the Institute of Physics on the scientific problems of nuclear physics and to introduce the achievements in the field of utilization of atomic energy into the national economy of the Baltic Republics. Lithuanian and Estonian scientists will also participate in the research work with the reactor.

At the August 1960 session of the Presidium of the Academy of Sciences Latvian SSR the following directions for the operations of the Institute were established: Nuclear physics and the utilization of isotopes: solid-state physics and physics of magnetic phenomena.

Among the themes of the first direction are the following:

(1) Nuclear spectroscopy of short-lived isotopes and of capture-gamma rays. Investigation of the properties (radiation spectre, lifetime, etc.) of radioactive nuclei with a half-life in the second and minute range;

(2) Investigation of radiation with magnetic spectrometers. Methods for the investigation of circular polarization of gamma-quanta during the capture of polarized neutrons will be developed and the quantum characteristics of the energy levels of the compound nuclei will be established. The spectra of the electrons of internal conversion of radioactive isotopes with a half-life ranging from several seconds to 2-5 days will be investigated with magnetic spectrometers. For such investigations of radioactive isotopes with a half-life measured in seconds and minutes, an electromagnetic mail service will be established for the delivery of irradiated specimens from the reactor into the spectrometer;

(3) The investigation of neutron fluxes in the active zone and in the experimental reactor channels;

(4) Theoretical investigation of the ionization and excitation of atoms and ions with slow electrons. The performance of these operations is dictated by the requirements of applied spectroscopy, astrophycis, and other divisions of physics and chemistry dealing with the computation of principal characteristics of atoms

and molecules, primarily of the effective cross sections of excitation and ionization. In particular, the compilation of a program of computation of excitation functions of various atoms for an electron digital computer is provided for and the computation according to these programs is being performed;

(5) Investigation of transient processes in radioactive primary elements of relay action. These investigations are needed because the principal parameters of the relay action devices (sensitivity, quick operation, and stability in work) depend to a great extent on the radiation detectors and the systems of relay registers used. The interrelationship of these parameters is especially significant in transient processes; these conditions are determined by the variations in the intensity of radiation in different registration processes.

In addition to this, one of the laboratories of the Institute which is experimenting with radioactive methods of automation is working now and will continue to work in the future on the methods of utilizing radioactive isotopes in science and technology. This work includes the study of the effect of statistical processes on the fundamental parameters of the apparatus for measuring radioactivity, investigation of the yield and the energy spectrum of the bremsstrahlung and of the characteristic radiation from β-sources and effective registration methods, development of new sources of soft γ-radiation and β-preparations, scientific development of the bases of standardization and normalization of the equipment for the automatic control of technological processes employing nuclear radiations.

The themes of the second direction include the following operations:

(1) Study of the problems of the effect of radiation on the magnetic and electrical properties of metals and alloys:

(2) Investigation of the effect of nuclear radiation on semiconductors and dielectrice;

(3) Study of diffusion phenomena in dielectris;

(4) Investigation of the structure of matter by the magnetic resonance method;

(5) Study of the magnetohydrodynamic phenomena in the flow of liquid metals in the presence of low Reynolds numbers;

(6) Study of the methods of electromagnetic transportation of liquid metals.

During the past five years the Latvian Institute of Physics worked on the development of a scientific foundation for the theory of electromagnetic pumps. During this period of time the Institute developed an approximate theory and a technique for calculation of the two principal types of electromagnetic pumps, the induction and the conduction. A number of experimental models of pumps, which exhibited good practical properties, were built. In 1960 operations were begun on the building of electromagnetic batch-meter pumps for feeding pressure casting machines which were ordered by the Leningrad Sovnarkhoz. The introduction of such batchmeters into industry will save tens of millions of rubles annually.

We may say that the Latvian Institute of Physics created a school of specialists for electromagnetic pumps which have a wide field of application in atomic technology.

Thus the range of problems posed before the Institute reflects the appreciable successes of Latvian physicists in the field of peaceful utilization of atomic energy.

The construction of the research reactor in Salaspils is only the first step in the expansion of the utilization of atomic energy in Latvia. The building of an atomic center based on the reactor in Salaspils is contemplated for the next few years.

Tentative plans are made for the construction of a physics-technology building for research on radioactive materials and radiation, and for extending the development of methods of their utilization in the national economy. The construction of a radiochemical building for the preparation, treatment, and packing of short-lived radioactive isotopes obtained on the reactor is also proposed.

On the territory of the atomic center a building will be erected for cryogenic machines which will manufacture liquid helium and hydrogen, and a radiation circuit with a high γ-ray intensity necessary for work in the fields of radiophysics, chemistry, and biology will also be built.

The long-range plan of the development of the center includes the construction of a linear accelerator building and a building for a proton accelerator of up to 25 Mev energy. The latter will be used for investigating the processes of interreaction of charged particles with nuclei and for obtaining certain radioactive isotopes which cannot be produced in the reactor. Lastly, a settlement for the housing of the personnel of the center will be built near the atomic center.

Thus, upon completion of the construction of the entire group of buildings in Salaspils the Latvian Institute of Physics will have at its disposal the most perfect equipment and will be enabled to solve important problems of utilization of atomic energy in the national economy.

Photograph cations: Illus. 1. General appearance of the construction of the research reactor building in Salaspils.

Illus. 2. Laying the foundation for the lower section of the reactor tank.

FORTY YEARS OF THE MOSCOW TEXTILE INSTITUTE

-USSR-

[Following is the translation of an unsigned article in Tekstil'naya Promyshlennost' (Textile Industry), No 2, Moscow, 1960, pages 96-97.]

In December 1959, in the Moscow Textile Institute, a scientific conference took place dedicated to the fortieth anniversary of the Institute. The conference was attended by professors and teachers of textile colleges, instructors, and scientific workers of research centers and workers of the textile industry.

The participants of the conference were informed of the scientific work carried out by the professors and instructors of the MTI (Moscow Textile Institute). Lectures on this subject were delivered by Professors G. N. Kukin, V. Ye. Zotikov, S. S. Kovner, A. V. Teryushnov, V. Ye. Gusev, A. S. Dalidovich, F. I. Sadov, M. V. Korchagin, Z. A. Rogovin, S. M. Lipatov, G. A. Bogdanov, S. P. Vostroknutov, I. A. Petrov, A. I. Makarov, S. N. Tatishchev, and others.

Many of the listeners participated in the discussions after the lectures. They all noted that during the 40 years of its existence the Institute has traveled a glorious road. It trained 11,858 engineers of various branches. At the end of 1959 the number of students in the institute was 3,246.

At the present time the MTI consists of six faculties: Technological, Chemical-Technological, Energy-Mechanica, Applied Art, Engineering-Economic, and an evening school.

It must be noted that during recent years the training of engineers who continued working on their jobs was appreciably increased in the Institute. The evening school, in which 918 students are studying, trains engineers of all branches.

In 1957, a branch of the evening school was established in the city of Pavlovo-Posad, which is one of the major centers of the textile industry of the Moskovskaya Oblast.

The Institute has well-equipped laboratories which are being systematically replenished with the latest equipment. Five hundred machines are distributed throughout the technological laboratories alone. This equipment not only serves for training, but for manufacturing finished products by the efforts of the students. In 1959 a laboratory dealing with the problems of creating new synthetic fibers was organized in the Institute.

Experience in the improvement of the system and technique of education and in the development of educational plans and programs, which was accumulated by the staff of the institute, made it a leading school for the training of professional personnel for the textile industry. Most of the textbooks and manuals for textile colleges were written by the professors and teachers of the Moscow Textile Institute. At the present time the library of the Institute contains over 350,000 volumes.

The institute performed great work in the field of mass improvement of the skill of textile-industry personnel. In 1952 the Institute had only 42 teachers. At the present time there are 260 professors and teachers of which 20 are professors and doctors of sciences, 135 docents and candidates of sciences, and 100 assistants and teachers.

Great attention is devoted in the Institute to the training of scientific-pedagogical personnel. Many of the graduates of the MTI are successfully working in the Leningrad, Ivanovo, Tashkent, and Kostroma textile institutes and other colleges of our country. Many of the students and assistants come from the countries of people's democracies.

By performing diversified scientific-research work the professors and teachers of the Institute contributed appreciably to the science and practical work of the textile industry. They have conducted profound scientific research and have developed new progressive technological processes and designs of machines and mechanisms.

The participants of the conference expressed their wishes to the collective of the Institute that they may achieve new successes in the training of highly qualified specialists and in the development of science and technology of the textile industry.

DEEP-SEA MICROBES

-USSR-

[Following is the translation of an article by Doctor of Biological Sciences M. I. Gol'din in Nauka i Zhizn' (Science and Life), No 9, Moscow 1960, pages 37-40, 50.]

Among the works honored by the Lenin Prize in 1960 is the book by Professor A. Ye. Kriss, Morskaya mikrobiologiya (glubokovodnaya) (Marine Microbiology [Deep-sea]). This article tells of the problems posed in this book and of the exploration of ocean depths performed by A. Ye. Kriss and his associates.

In 1906 the well-known Russian scientist Boris Lavrent'yevich Isachenko left on a long voyage on the steamship "Andrey Pervozvannyy" to study the microbes inhabiting the seas and oceasn. The keen investigator wished to solve many problems. At that time it was not even known whether bacteria exist in the cold waters of Arctic Ocean.

In his work Issledovaniya nad bakteriyami Severnogo Ledovitogo okeana (Investigations of the Bacteria of the Arctic Ocean), published eight years after the completion of the expedition, he wrote: "It was clear ... that not much can be achieved with a single cruise made in one year. It became evident that a second investigation was necessary in order to obtain more plausible concepts on the constancy of the distribution of bacteria along the known currents and on the continuity of the processes occurring therein. However, it proved impossible to fulfill this condition which was so necessary for an accurate work, because the expedition ceased to exist."

How differently sound the words of the same scientist three decades later!

In 1937 in his article, "Microbiological Investigations of the Seas of the USSR," Academician B. L. Isachenko wrote: "The study of the microbiology of the sea in the USSR is carried out on such a large scale the like of which we do not see in other countries. The investigations in the Black Sea in 1890-1891 by Andrusov, Zelinskiy, Lebedintsev, and others produced the first clear proofs of the significance of microorganisms in the biology of reservoirs. However, the development of consistant activity in almost all the seas bordering on the Union was clearly and systematically performed only under the Soviet government."

In 1946 the Institute of Microbiology of the Academy of Sciences USSR in cooperation with the Sevastopol' station organized microbiological investigations of regions of great depths in various seas and oceans. Prior to this, microbiological investigations were performed mainly in the surface layers and in coastal regions. The collective of microbiologists headed by Professor A. Ye. Kriss with daring and efficiency undertook the study of the microorganisms of the entire water layer and of the floor of seas and oceans.

For many years A. Ye. Kriss was a dry-land scientist, but on joining the work of the section which was once directed by Academician B. L. Isachenko he became gradually transformed into a sea-going naturalist. He became a courageous "hunter of the sea," huntin g infinitely small creatures -- microbes, the significance of which in the life of the reservoirs is as great as it is on dry land.

Under Unusual Conditions

The study of the micro-flora of the world ocean is an extremely difficult problem. Let us take, for example, the following problem: Count the number of infinitely minute creatures, the size of several thousands of the millimeter, at different depths.

Under favorable conditions the representatives of the most widely distributed microorganisms, the bacteria, split in two every 30-60 minutes and, consequently, during this short period their number may double. It is true that the oceonographic ship "Vityaz'," which is a floating scientific research institute, has an excellently equipped microbiological laboratory, but even under these conditions obtaining an exact impression of the density of the microbe population and microbiological processes occurring in the layer of water is an extremely complicated problem.

In addition to this the vessel pitches and rolls at times very strongly. There were instances when the still inexperienced members of an expedition became so sea-sick while performing the assigned program of operation that they had to be quickly transferred ashore. In the university the biologists were not taught the art of walking like regular sea-dogs over a tilting deck carrying fragile instruments or watches, or sitting at the microscope while swinging as on a swing. However, in the long run one can get accustomed to all of this. The mastering of other difficulties is still more complicated. In the air, on the surface of the apparatus, everywhere there is a great number of microbes. One must find methods of taking samples for analyses so as to determine the real microbe population of the locations being investigated without the inhabitants of the upper layers of the sea and of the air. Here, in addition to a jeweler's precision of the specialized

technique and extremely strict conditions of laboratory work, talent in the experimenter is required. This problem was to a great extent solved by the collective of microbiologists headed by Professor A. Ye. Kriss. In his substantial book published in 1959, Morskaya mikrobiologiya (glubokovodnaya), the minutest possibility of microbes entering from the outside onto the test sample is traced step by step. Thus, for example, the faucet of the bathometer, whose duct is not washed with sea water because it is closed during the lowering of the apparatus, should be thoroughly sterilized with fire. At the same time, the great friction of the walls of the bathometer against the water prevents the adhesion of bacteria, so that the latter cannot be carried in this manner into the deeper layers of water. These are only two of the tens of examples which can be adduced.

As the result of this strict and punctual adherence to all requirements, exceptionally valuable experiments were performed, unique results were attained, and bold and extremely interesting hypotheses were profferred.

Microbes Under the Ice.

The successes of Professor Kriss' work were of course due not only to the high standards of laboratory work. "That which had recently appeared to be an impossible dream," writes Anatoliy Yevseyevich, "namely, the microbiological investigations in the Central Polar basin, particularly in the area of the North Pole, now became reality. Unprecedented opportunities for microbiological investigations in the Central Arctic regions presented themselves upon the organization of the drifting stations." Now all the conditions were present for answering the question: Does bacterial life exist in the Central Arctic regions, in the depth of the Arctic Ocean under pack ice many years old?

Flight to the North Pole and work on the drifting station, especially toward the very end of the drifting, are accompanied by unexpected dangers. However, this did not disturb Professor Kriss. He willingly shared all the adversities and hardships which were the lot of the courageous inhabitants of the drifting scientific stations. In 1954 the scientist made two flights to the station "North Pole-3" and in 1955 performed investigations on stations "North Pole-3" and "North Pole-5".

In 1956 work was carried out in the region of the pole of relative inaccessibility. Shallow dishes with a nutritive medium for the microorganisms and equipped with special filters through which passed the samples of water under investigation, were placed in special metal boxes. The boxes were suspended under the dome of the tent where the temperature was kept at a steady 25-27°C. In these unusual incubators the single cells of the microbes germinated. Upon multiplying they produced numerous progeny, a colony

visible to the naked eye. The number of colonies formed enables the microbiologists to judge the number of microbes in the given specimen. In this manner, as if it were on a photographic plate, one, two, tens, and even hundreds of colonies began to appear on the filters with specimens of water taken from different depths.

In individual specimens drawn from the ocean of the Central Arctic region, from a depth of 3,700 meters, 140 bacteria were found in a liter of water, whereas 3,045 bacteria were found in a liter of water drawn from the depth of 200 meters. In water drawn from depths of 100 and 250 meters and in mud raised from a depth of 3,450 meters were found not only bacteria but also yeast which formed white and pink colonies.

Thus the "proof" of the actual existence of microorganisms in the depths of the Arctic Ocean under several years' pack ice of the Central Arctic regions grew in the shallow dishes of the micro-biologists like mushrooms after a good summer rain.

An Unusual Census

The investigations of Professor Kriss during the recent years were performed on an impressive scale. With the aid of a small staff he conducted a unuique census of the microbe population of the seas of Arctic Oceans, the Sea of Okhotsk, the Greenland Sea, and other waters of the Central Arctic region, of the Pacific and Indian Oceans, the Black Sea and the Caspian Sea. Microbiologists investigated the deepest depressions of the Pacific Ocean for the first time.

In the book Monskaya Biologiya, which is a systematic chronicle of fascinating expeditions, extremely valuable factual data is adduced on the quantitative contents and the range of species of microorganisms at different depths of the ocean, from the surface to the bottom. The laws governing the distribution of microorganisms in various geographical zones of the world ocean are described in detail in this book.

Microbiologists usually write of the significance of the mibrobes in the productivity of the waters. What is the meaning of such a phrase? It is very broad, as we found out. Microorganisms decompose the dead organic substance, the "rain of corpses" constantly falling to the bottom, and transform it into compounds which serve as food for aquatic plant life. In addition to this the bacteria tehmselves serve as food for water animals. Consequently, in all this complex "nutritive cycle" the microbes form the first link. The weight of one bacterial cell is equal to approximately one gram divided by one with thirteen zeroes. Nevertheless, according to the computations of Anatoliy Yevseyevich Kriss, the waters of the middle and southern Caspian Sea contain a total of over 1,600,000 tons of microbes. For the transportation of such a load more than 100,000 railroad cars would be needed.

Discovery in the Pacific Ocean

The world of the microbes is extremely vast and varied. The well-known Swedish scientist Carl Linnaeus said that the eye of the naturalist must be sharper than the eye of the lynx. This quality is especially indispensable for the scientists working in the sphere of microbiology. The sharp eye and the experience of an investigator helped Professor Kriss discover in the oceans a completely new unique class of microorganisms. This discovery has a history of its own. In 1951, during the Pacific Ocean expedition of the "Vityaz" the so-called ipibiose glass plates were lowered to various depths near the Kuril Islands. Filiform-racemose microorganisms, with heads consisting of orbicular corpuscles, were detected on glass plates raised from the water after a 25-hour period. These microorganisms are encountered in the oceans only in the free-floating state in particles suspended in water, therefore, they could be "caught" only on the epibiose plates. The plates brought them from the oxygen-rich zone and from the waters of the Black Sea where hydrogen sulfide concentration is very high. They were caught at various depths of the pacific and Atlantic Oceans and in the central regions of the Polar basin. Only in the Caspian Sea and in Lake Baykal could these microbes not be found.

Resting forms of these microorganisms were found in bottom deposits at great depths. If we take into consideration that the formation of one millimeter of sediments on the bottom of the pacific Ocean requires approximately 1,400 years, then we can deduce that the levels with a higher content of these forms constituted the ocean floor millions of years ago. It is quite possible that the filiform microbes are extremely ancient creatures which now do not find conditions favorable for their vital activity that existed in the old days.

The American microbiologist Claude ZoBell of the Oceanographic Institute of the University of California writes: "The utilization of the technique of immersed glass plates in conjunction with meticulous microscopic investigations permitted us to discover some unique morphological types of marine microbes."

Even now the scientists have not been able to make these microscopic wonders live and reproduce outside their natural habitat.

Radiosynthesis

Professor Kriss' investigations provide us with a basis for assuming the existence of a special form of energy which can evidently be used by certain microbes. The point is that in computing the balance of energy in the process of the development of purple sulfur bacteria in the layer of water of the hydrogen sulfide

area of the Black Sea the scientists discovered a deficiency of energy. How is this deficiency compensated? Perhaps at the expense of radioactive decay? The daring assumption of the utilization by microorganisms of this new source of energy, which until now was unusual even for the ubiquitous microbes, suddenly attains a special significance in connection with the exploration of the moon. It is assumed that the surface of the moon is extremely radioactive. If we admit that certain microbes live on the moon and on other planets then the source of energy necessary for their existence could even be radioactive decay.

By means of photosynthesis green plants utilize solar energy. Certain microbes are capable of utilizing chemosynthesis, that is, they live off the energy liberated by the transformation of, for example, ammonia into nitric acid or hydrogen sulfide into sulfuric acid. In a similar manner, asserts Professor Kriss, we can talk of radiosynthesis.

Tracking the Microbes

Microbiologists are accustomed to the fact that when they "follow the tracks" of the microbes they frequently have to intrude into the most unusual nooks and crannies of nature, in the most diversified sections of biology, medicine, industry, and agriculture. On the basis of microbiological investigations it is often feasible to solve economically important problems from the "departments" of other sciences. Microorganisms which are a powerful motive force of chemical transformations in nature and an indispensable link in the material cycle, are successfully utilized as accurate and precise indicators of the presence or absence of certain processes or substances. For example, some microbes which are capable of developing by utilizing gases given off by oil deposits are used as petroleum finders. The microbiological method is used in order to determine the need for fertilizer in the soil and in precise chemical analyses of vitamins and other substances. Microorganisms, especially certain species, are extremely sensitive to the slightest variation in the chemical composition or physical conditions of the ambient medium. This is true both on dry land and on the sea. This important aspect is discussed in a large section of Professor Kriss' book: "Microorganisms as Indicators of Hydrological Phenomena in Seas and Oceans."

Layers of water of warm Atlantic current were detected in the highest latitudes of the Central Arctic regions. This branch is warmer than the surrounding water by only one degree. It would appear that the difference is almost imperceptible but it is revealed sharply, as if magnified by a powerful lens, in the count of the microbe population.

Upon tracing the vertical quantitative distribution of bacteria, microbiologists established the fact that in the vicinity of the Antarctic Continent and in the Arctic regions the entire water layer is poor in bacteria which require easily assimilable organic substances; whereas, as proved by investigations in other regions, the water mass of the equatorial-tropical zone is extremely rich in these microbes. Thus, utilizing the microbiological cross sections which traverse the oceans along the meridians, it became possible to establish the distribution and the displacement of the bacteria-rich equatorial-tropicak waters which as mighty currents wedged into the antarctic areas which are poor in micro-organisms. The scientists established that in the Greenland Sea there are thick layers of water of equatorial-tropical origin at the depths of 750 -- 1,000 -- 2,000 meters. In certain places these waters extend to a depth of 3,000 meters and fill the bentho-pelagic region. It became obvious that the Gulfstream exercises its influence at much greater depths than it had been assumed, namely, at 2,000 and 3,000 meters and not at 1,000 meters.

The circulation and distribution of the masses of water in the Oceans can be traced by other factors than the anomalies of the microbe population. The idea of the establishment of the origin of the water according to the areas of microbe types exhibiting characteristic features, is quite brilliant. The essence of the above idea lies in the fact that the existence of certain species or types of microbes is characteristic of definite ecologic-geographic conditions. It is evident that in the locations where certain microbes are found the specific conditions necessary for their livelihood are to be found also.

The Investigations Continue

Thus, the hydrological trend of marine microbiology opens new vistas for the study of the dynamics and origin of the masses of water in seas and oceans. This method is especially important for discovering deep oeeanic currents; thereby even the weakest of the currents can be detected.

Owing to their high and varied activity, the microorganisms distributed in the layer of water and inhabiting the ocean floor act as bio-catalysts for the reactions in the material cycle which is indispensable for sustaining the life of plants and animals. Unless the living mass of the microorganisms, their properties, and specific features manifested in the specific conditions of the constantly changing medium are taken into account, it is impossible to know in its entirely the life of the oceans, their biology and geology.

Marine microbiology has occupied an exceptionally important position in the solution of the problem of the productivity of the sea and ocean waters. However, much is demanded of those to

whom much was given. The existing scope of microbiological work in seas and oceans is already proving to be inadequate. New research, new long expeditions, and newly advanced methods are necessary. The published lists of the species of marine microbes permit us to judge of only an extremely small portion of the microscopic inhabitants of the seas. How many discoveries are yet forthcoming; How many mysteries are still preserved in the watery depths of the oceans, on the ocean floor! At the very moment when these lines are being written, in the Marine Microbiology Section of the Institute of Microbiology of the Academy of Sciences USSR the lids are being nailed down on boxes in which laboratory glassware, equipment, and nutritive media for various microbes are packed. Laboratory benches are piled high with maps with routes marked on them, with tracing cloths covered with charts and graphs, lists of proposed stations, operating projects, books, manuscripts, galley proofs, letters, telegrams. The microbiologists are getting ready to sail ...

* The world of microorganisms is amazingly varied and ubiquitous. The color insert [not reproduced here] shows the map of the microbiological stations at which Soviet scientists performed the investigations of the ocean depths. Red circlets designate the locations of these investigations. They are performed in the region of the North Pole, Pacific, Indian, and Atlantic Oceans, Greenland Sea, Sea of Okhotsk, and many other seas. While "tracking the microbes," tracing their vertical quantitative distribution in the layer of water, the microbiologists have found that, for example, in the Indian Ocean in the layers of equatorial-tropical water (in the upper right corner of the picture they are colored dark green) there are appreciable layers of microbiologically deficient water of Atlantic origin (colored yellow).

Filiform-racemose microbes are representatives of a new class of microorganisms discovered by Professor A. Ye. Kriss. They have been discovered in many oceans and seas both in the upper layers and at great depths. Our drawing shows them magnified many times and colored with a special dye as it is done for studying their structure under the microscope.

In the test-tube (lower left) is pink yeast "fished out" of places which are apparently entirely insuitable for them, namely, from the sea bottom. Next to it is a limonite "cheesecake." This thick "cheesecake," four-five centimeters in diameter, originated from ... cases of iron bacteria on the bottom of the Kara Sea.

[Captions to illustrations. Not reproduced here]

Illus. 1. A long tube with a core of mud is raised with great difficulty from the bottom of the turbulent Greenland Sea.

What "invisible" creatures will be found in it? How many?

Illus. 2. A "column" of 60 microbes can be easily strung along the cross section of a woman's hair.

Illus. 3. Microbiologists proved that the continuous "rain of corpses" depicted on this drawing does not remain buried at the bottom of the Black Sea. As the result of the colossal activity of the microbes, the food values locked in the remains of the crustaceans, larvae, lower algae, etc., are mineralized and returned into the "living" layer of the sea. Thus microbiological investigations of the fate of the "rain of corpses" resulted in the refutation of the theory that the productivity of fisheries of certain layers of the Black Sea is decreasing.

Illus. 4. This abundance of microbe forms was disclosed by the epibiose glass plates at different depths of the northwestern sector of the Pacific Ocean. However, the greater the depth, the more monotonous the microbe "scenery."

Illus. 5. This is how the epibiose glass plates look (fastened to a cable) which were lowered to the depths of several thousand meters for taking samples of microbes.

Illus. 6. With this planton seine small animals and vegetable organisms were collected in the upper layers of the sea; it is also used for catching the "rain of corpses."

CHEMISTRY AND AGRICULTURE

-USSR-

[Following is a translation of an article by Academician S. I. Vol'fkovich in Nauka i Zhizn' (Science and Life), No 8, Moscow, 1960.]

Feed Phosphates

As we well know, phosphorus is one of the important elements in the food of animals. Phosphorus compounds assimilable by animals are included in feed phosphates, the products industrially prepared by reprocessing superphosphate at an elevated temperature.

Until recent times the production of feed phosphates as well as of phosphate fertilizers required a large amount of acids. Other methods based on the production of phosphoric acid and its salts consumed great amounts of power.

At the end of 1959 the Sumskoy plant of the Khar'kovskiy Sovnarkhoz mastered the new original process offered and developed by a group of chemists of the Scientific Institute for Fertilizers and Insecto-fungicides (NIUIF); this new process does not require great amounts of acids or electric energy. This method frees feed phosphates of the element fluorine which is harmful to animals. Since this product is manufactured without sulfuric acid, it does not contain other harmful elements, namely, lead and arsenic. The so-called fluorine-free feed phosphates prepared by the new method contain 1.5 - 2 times more phosphorus than superphosphate.

In this process the apatite concentrate with an addition of 2 - 3% sand is treated with steam at a high temperature. Fuel oil or natural gas were used as fuel for roasting the furnace charge. The new production technique was proposed and developed by the following members of the NIUIF and its pilot plant: N. N. Postnikov, V. V. Illarionov, R. Ye. Remen, A. A. Ionass, S. I. Vol'fkovich (Director of Operations), and others, while its industrial production was developed by the collective of the Sumskoy superphosphate plant (Director P. I. Gorbik, Chief Engineer M. Ye. Giller, Head of Division I. M. Kalachitskiy) and of the Giprokhim (State Institute for Planning the Chemical Industry) (engineers S. D. Frenchik, V. A. Kononov, and others).

The new type of phosphate contains 36 - 38 percent of phosphorus pentoxide assimilable by animals and not over 0.2% fluorine. Practical application of the fluorine-free phosphate proved its effectiveness both as a fertilizer in all types of soils and as a valuable feed product.

Combined Fertilizers

An appreciable portion of agricultural crops, such as potatoes, vegetables, sugar beet, cotton, fruit, and others require simultaneous fertilizing with two, three, and more nutritive elements. In order to produce such compound, or mixed, fertilizers the follective and state farms mix nitrogen, phosphorus, and potassium fertilizers. This procedure often results in losses of material and labor.

In the course of the Seven-Year-Plan a number of large plants will be built for the production of combined fertilizers produced as a result of chemical reaction between different types of raw materials. The Ukraine nitrogen fertilizer plant has mastered on the pilot plant scale the production of several types of combined fertilizers of the "nitrofoska" ["nitro-phos-pot"] type, containing nitrogen, phosphorus, and potassium. Trace elements are introduced into some of them. The industrial procedure is based on the treatment of apatite or phosphorite with nitric acid, followed by the addition of ammonia and a potassium salt. It is more advantageous to use nitric acid and not sulfuric acid (which is widely used in the fertilizer industry), because the former does not produce waste products since it is used not only for the decomposition of the phosphate but constitutes one of the components of the fertilizer.

The combined fertilizers contain 10 - 16% phosphorus pentoxide, 13 - 16% nitrogen and 10 - 20% potassium oxide. The new fertilizers, therefore, are not only complex but also concentrated, since they contain a total of 36 - 55% nutritive materials, or 2 - 2.5 times more than does superphosphate or ammonium sulfate. This results in an appreciable economy in transportation, containers, and application of the fertilizer in the fields. These fertilizers are homogeneous, spread well, and can be produced in the powdered or granulated form.

The methods of production and the equipment for the manufacture of combined fertilizers were developed by the Scientific Institute for Fertilizers and Insectofungicides (NIUIF), the State Institute of Nitrogen Industry (GIAP), and the personnel of the nitrogen fertilizer plant.

Experimental work was conducted by plant personnel, including A. I. Sverdlova, M. I. Bogdanov, M. K. Avilova, and others in collaboration with the scientific workers of the Institutes: F. G. Margolis, N. N. Polyakov, T. V. Glazova, and others.

Synthetic Urea

In the next few years our chemical industry will begin producing a large amount of high-nitrogen fertilizer and animal feed,

namely, synthetic urea. Its production will be increased many times over. Urea is an important supplement to albumen in the feeding of animals, and increases their weight and the quality of their products. As a fertilizer it is no less effective since it contains 46% nitrogen, keeps well, and can be produced in the form of a slowly dissolving salt. In actual practice some nitrogen fertilizers are lost in a number of areas because they are dissolved in rain and irrigation water.

The latest achievements of science make it feasible to produce urea by the synthesis of ammonia and carbon dioxide at a cost which is almost equal to that of other nitrogen fertilizers.

NEW ADDITIONS TO THE MEMBERSHIP OF THE SIBERIAN DEPARTMENT OF THE ACADEMY OF SCIENCES USSR

[Following is the translation of an unsigned article in Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR (News of the Siberian Department of the Academy of Sciences USSR) No 8, Novosibirsk, 1960, pages 153-154.]

On 6-10 June 1960 general meetings of the Sections covering various branches of sciences of the Siberian Department and the general meeting of the Academy took place in the Academy of Sciences USSR in Moscow. At the meetings new academicians and corresponding members were elected.

At the 10 June 1960 general meeting of the Academy of Sciences USSR eight major scientists of the Siberian Department were elected corresponding members of the Academy of Sciences USSR.

In Physics. Lenin Prize Laureate, Doctor of Physico-mathematical Sciences, Prof Dmitriy Vasil'yevich Shirkov, one of the prominent physicist-theoreticians of the Soviet Union. His works in the sphere of quantum theory of the field and the theory of elementary particles received wide recognition. D. V. Shirkov made an important contribution to science by his research in the sphere of dispersion relationships and the so-called renormalization group.

Lenin Prize Laureate, Doctor of Physicomathematical Sciences, Prof Petr Georgiyevich Strelkov, a physicist well known for his experiments in low temperatures. The profound and unique investigations of P. G. Strelkov, which have an essential theoretical and practical significance, have led to the discovery and study of a series of new properties of materials, which are of great significance in science and the development of modern technology.

In Energetics. Chairman of the Presidium of the East Siberian Affiliate of the Siberian Department of the Academy of Sciences USSR, Doctor of Economic Sciences, Prof Lev Aleksandrovich Melent'yev a prominent energeticist, author of over 60 scientific papers on the subject of regional heating of houses by a power station, industrial thermo-energetics, and the economics of energetics in USSR. In the Soviet Union the biggest problems of energetics pertaining to the specific features of the development of thermal electric power plants and, in particular, of the heating-and-power stations

as an element of complex energetics system were worked out under the direction of L. A. Melent'yev. He also directs research on the scientific problems of a single fuel-power balance.

In Geology. Chairman of the Presidium of the Yakutiya Affiliate, Stalin Prize Laureate, Doctor of Geological-Mineralogical Sciences, Prof Ivan Sergeyevich Rozhkov, a well-known specialist on the geology of gold and platinum. His work played an important part in the establishment of the source of the raw materials of the gold mining industry of the Urals and the Transbaykal area. I. S. Rozhkov was also responsible for the solution of a series of problems on the placer deposits of diamonds in Yakutiya.

Director of the Sector of Regional Geology of the East Siberian Geological Institute, Siberian Dept. of the Acad. of Science USSR, Doctor of Geological Mineralogical Sciences, Prof Nikolay Alesandrovich Florensov. He has devoted over 30 years to the study of the geological structure of the Siberian Platform and its framework. He is the author of 50 scientific papers which illuminate the problems of the prognosis of the deposits of many minerals, including rare and precious metals, oil, coal, and others.

Stalin Prize Laureate, Doctor of Geological Mineralogical Sciences, Prof Alexandr Stepanovich Khomentovskiy, a prominent scientist in the sphere of theoretical geology. He discovered, explored, and put into operation large brown coal deposits of the Kanskiy and Chulymo-Yeniseyskiy coal basins. In the southern Urals, under his direction the Bashkir brown coal basin was studied and explored in a short period of time.

In Chemistry. Deputy Director of the Institute of Inorganic Chemistry, Sib. Dept. of the Acad. of Sciences USSR, Doctor of Chemical Sciences, Prof Boris Vladimirovich Ptitsyn, a prominent scientist in the sphere of inorganic chemistry, chemistry of complex compounds, as well as physical and analytical chemistry. He completed a series of fundamental works devoted mainly to the oxidation-reduction equilibria with the participation of metals of the platinum group. B. V. Ptitsyn is also well known as the author of a series of complex analytical papers of great significance in the industry of platinum group metals. A major portion of his research is devoted to fundamental problems of the theory of complex compounds.

Director of the Irkutsk Institute of Organic Chemistry, Sib. Dept. of the Acad of Sciences USSR, Stalin Prize Laureate, Doctor of Chemical Sciences, Prof Mikhail Fedorovich Shostakovskiy, creator of a new sphere of organic chemistry, the chemistry of simple vinyl ethers. He introduced into general use several new effective medicines. The "Shostakovskiy balm," used for the treatment of wounds, stomach ulcers, and certain other diseases is well known in medicine. M. F. Shostakovskiy performed important research on new silicone compounds. At the present time eleven academicians and 35 corresponding members of the Academy of Sciences work in the Siberian Department of the Academy.

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